A STUDY ON INFLUENCE OF DIABETES ON SHORT-TERM MORTALITY IN ELDERLY PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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ABSTRACT

BACKGROUND

Cardiovascular problems are a major cause of mortality in India, causing > 25% deaths. About 30% acute coronary syndrome patients had diabetes mellitus and 70% were above 50 yrs. of age.

This study was carried out to know the influence of Diabetes on short-term mortality in Acute Myocardial Infarction in elderly patients.

MATERIALS AND METHODS

This is a prospective observational study conducted in 100 patients in Government Stanley Medical College Hospital, Chennai, over 6 months period. A predefined proforma was completed in every patient with detailed history, physical examination, lab and investigation parameters, interventions and outcome. Persons satisfying the inclusion criteria based on age, definition of acute MI and diabetes mellitus were assessed on the basis of history, clinical examination, ECG changes, cardiac biomarkers and diabetic status. Statistical analysis was done using Epi-Info software and Chi-square test for comparing categorical variables.

RESULTS

Mean age of study population was 70.26 +/- 13.44 yrs. Out of 100 patients studied, 93% had STEMI and 7% had NSTEMI. Pattern of wall involvement in Myocardial Infarction was almost equal, about 25% were diabetic. 52 patients presented within 4 hours of onset of symptoms and 7 patients after 12 hours. 73% patients presented in Killip class-1, 20% patients in Killip class-2, 5% patients in class-3 and 2% in class-4. The in-hospital mortality was 25% and for diabetics it was 41.67%.

CONCLUSION

Elderly patients with Acute Myocardial Infarction had a significantly increased chance of in-hospital mortality if they were diabetic.

KEY WORDS

Diabetes Mellitus, Myocardial Infarction, Elderly, Short-Term Mortality.

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BACKGROUND

Cardiovascular diseases are a major cause of mortality in India, causing > 25% deaths. Indians develop coronary artery disease at an earlier age. 30.4% of the acute coronary syndrome patients had diabetes mellitus. 70% patients were above 50 yrs. of age and 13.3% above 70 yrs.⁽¹⁾ Diabetes mellitus is associated with vascular endothelial dysfunction and accelerated atherosclerosis. The risk of developing coronary artery disease has increased 2 - 4 fold by developing diabetes.⁽²⁾ Among persons with CAD, diabetes increases the risk of developing an acute coronary syndrome and of death after an acute myocardial infarction. Elderly patients with acute myocardial infarction fare worse than young patients. The elderly diabetics are at a greater risk of developing myocardial infarction, recurrent myocardial infarction and cardiac dysfunction.

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Diabetic patients seek medical care late and they are less likely to receive thrombolytic therapy.⁽³⁾ The in-hospital mortality is higher in diabetic patients in contrast to non-diabetics, as is the 30-day mortality. However, there have not been sufficient studies on the influence of diabetes mellitus in the outcome of acute myocardial infarction in the elderly population.⁽⁴⁾

Objective- To study the influence of Diabetes on short-term mortality (within 30 days of admission) in Acute Myocardial Infarction in elderly patients admitted in Government Stanley Medical College, Chennai.

MATERIALS AND METHODS

This is a prospective observational study on 100 patients admitted in Intensive Cardiac Care Unit, Cardiac and Medical wards of Government Stanley Medical College, Chennai with acute myocardial infarction over a period of 6 months from March 2015 to August 2015. Sample size was taken conveniently.

Inclusion Criteria

- Patients of age ≥ 60 years.
- Acute myocardial infarction as defined below:

For the purpose of this study, Acute Myocardial Infarction was defined as the presence of rise and/or fall of cardiac biomarkers after the index pain with at least one value above

3 times the normal upper reference limit with at least one of the following.

- Symptoms of ischaemia.
- ECG changes suggestive of new ischaemia.
- Development of pathological Q-waves in the ECG.
- New regional wall motion abnormality on Echocardiography.⁽⁵⁾

Exclusion Criteria

Persons presenting more than 10 days after the onset of symptoms.

Methodology

For the purpose of this study diabetes was defined as a history of diabetes mellitus, taking drugs for diabetes mellitus or the presence of any one of the-

- Symptoms of diabetes plus random plasma glucose concentration ≥ 200 mg/dL
- FPG ≥ 126 mg/dL
- HbA1c $\geq 6.5\%$ ⁽⁶⁾

Acute myocardial infarction as has been defined above. Persons satisfying the inclusion criteria were assessed on the basis of history, clinical examination, ECG changes, cardiac biomarkers and diabetic status. Patients will be followed up 30 days after discharge. Risk stratification was done using TIMI score, calculated at admission. It was calculated separately for ST elevation and non-ST elevation myocardial infarction. A higher score meant a higher risk of complication and mortality.

Ethical Aspects

Informed consent was taken from the patient. There were no major ethical issues involved as no invasive procedures were done on patients as part of the study alone. The study did not have financial support from any source and did not cause any financial burden to the patient.

Statistical Analysis

Statistical analysis was done using Epi-Info Software version 7.1.2.0. Continuous variables were presented as mean values with Standard Deviation. Chi-square test was used for comparing categorical variables. Fisher Exact test was used for variables less than 5 in number to compare categorical data. Where necessary, Odd's ratio was calculated and presented. A probability value of < 0.05 was considered statistically significant.

RESULTS

Age Distribution

Of the 100 patients studied, 91 (91%) were < 80 years of age. Nine (9%) were ≥ 80 years. The mean age of the study population was 70.26 ± 13.44 years. Mean age of patients without diabetes was 70.21 ± 13.44 years. Mean age of the diabetic population was 70.42 ± 13.70 years.

Gender and Diabetes Mellitus

64 patients were male and 36 female. 24 (24%) of them were diabetic. 13 (20.31%) of the males and 11 (30.56%) of the females had diabetes mellitus.

	Diabetic	Non-Diabetic
Male	13	51
Female	11	25

Table 1. Gender and Diabetes Mellitus in Elderly Patients with Acute MI

Chart 1. Gender and Diabetes Mellitus in Elderly Patients with Acute MI

Pattern of Wall Involvement in Myocardial Infarction

Of the 100 patients studied, 93 (93%) had ST elevation myocardial infarction and 7 (7%) had non-ST elevation myocardial infarction. 36 patients presented with anterior wall myocardial infarction, of which 9 were diabetic. Out of 37 patients who had inferior wall myocardial infarction, 9 were diabetic. 17 patients had combined inferior and posterior wall myocardial infarction. 5 of them were diabetic. 1 out of the 9 cases of lateral wall myocardial infarction was diabetic. There was a single case of new-onset left bundle branch block.

Wall Involvement	Inferior Wall	Anterior Wall	Inferior+Posterior	Lateral Wall	New LBBB
Frequency	28	27	12	8	1
Percent	36.84%	35.53%	15.79%	10.53%	1.32%
95% CI Lower	26.06%	24.88%	8.43%	4.66%	0.03%
95% CI Upper	48.69%	47.34%	25.96%	19.69%	7.11%

Table 2. Pattern of Wall Involvement in Acute MI in Elderly Non-Diabetics

Wall Involvement	Inferior Wall	Anterior Wall	Inferior+Posterior	Lateral Wall	New LBBB
Frequency	9	9	5	1	0
Percent	37.50%	37.50%	20.83%	4.17%	0.00%
95% CI Lower	18.80%	18.80%	7.13%	0.11%	0.00%
95% CI Upper	59.41%	59.41%	42.15%	21.12%	14.25%

Table 3. Pattern of Wall Involvement in Acute MI in Elderly Diabetics

Chart 2. Pattern of Wall Involvement in Acute MI in Elderly Patients

Time for Treatment

52 patients presented within 4 hours of onset of symptoms. 10 (19.23%) of them were diabetic. 41 presented within 4-12 hours of symptom onset. 12 (29.27%) of them were diabetic. Seven patients presented more than 12 hours after beginning of symptoms. Two of them (28.57%) were diabetic.

Time for Treatment in Hours	Diabetic	Non-Diabetic
≤ 4	10	42
4 to 12	12	29
> 12	2	5

Table 4. Time for Treatment in Elderly Patients with Acute MI

Chart 3. Time for Treatment in Elderly Patients with Acute MI

Door to Needle Time

Of the 93 cases of ST elevation myocardial infarction, 84 were thrombolysed. Door to needle time was less than 30 minutes in 40 (47.62%) cases. Of the 18 diabetics who were thrombolysed, door to needle time was less than 30 minutes in 8 (44.44%) patients. There was no significant difference of door to needle time in diabetic and non-diabetic patients (p-value= 0.76).

	Door to Needle Time	
	≤ 30 Minutes	> 30 Minutes
Diabetic	8	10
Non-Diabetic	32	34

Table 5. Door to Needle Time in Elderly Patients with Acute MI

Chart 4. Door to Needle Time in Elderly Patients with Acute MI

Killip Class

73 (73%) patients presented in Killip class 1. 20 (20%) had Killip class 2 at admission. Five (5%) and two (2%) patients had Killip classes 3 and 4 at admission, respectively.

Killip Class	Frequency	Percent	95% CI Lower	95% CI Upper
1	73	73.00%	63.20%	81.39%
2	20	20.00%	12.67%	29.18%
3	5	5.00%	1.64%	11.28%
4	2	2.00%	0.24%	7.04%

Table 6. Killip Class at admission in Elderly Patients with Acute MI

Chart 5. Killip Class at admission in Elderly Patients with Acute MI

Mortality

The in-hospital mortality was 25% (n= 25). Patients were telephonically followed up regarding the 30-day mortality. Of the 100 patients studied, contact details were available for 68. Of these, 14 patients died before discharge. Of the surviving 54 patients, 16 were lost for follow-up. Of the 38 patients contacted, 2 had died during the period.

Diabetes and In-Hospital Mortality

In-hospital mortality of diabetic patients was 10 (41.67%). That of non-diabetics was 15 (19.74%). There was a significant difference between the two groups. (Odds Ratio 2.9048, 95% CI 1.0807 - 7.8077, $p=0.03$).

	In-Hospital Non-Survivors	In-Hospital Survivors
Diabetic	10	14
Non-Diabetic	15	61

Table 7. In Hospital Mortality of Acute MI in Elderly Diabetics and Non-Diabetics

Chart 6. In-Hospital Mortality of Acute MI in Elderly Diabetics and Non-Diabetics

Random Blood Sugar at Admission and In-Hospital Mortality

Data regarding Random Blood Sugar (RBS) at admission was available for 85 patients, of which 23 were diabetic and 62 were non-diabetic. Among non-diabetics in-hospital mortality in patients with RBS < 200 mg/dL was 9 (17.65%). In patients with RBS ≥ 200 mg/dL, in-hospital mortality was 2 (18.18%). There was no significant association between RBS at admission and in-hospital mortality in this group ($p=1.00$). Of the diabetics, 3 (30.00%) non-survivors had RBS <200 mg/dL. While 7 (53.85) of them had RBS ≥ 200 mg/dL. The difference between the two groups was not significant ($p=0.40$).

	Non-Survivors	Survivors
RBS < 200	3	7
RBS ≥ 200	7	6

Table 8. RBS at admission and In-Hospital Mortality in Elderly Diabetics with Acute MI

	Non-Survivors	Survivors
RBS < 200	9	42
RBS ≥ 200	2	9

Table 9. RBS at admission and In-Hospital Mortality in Elderly Non-Diabetics with Acute MI

TIMI Score and In-Hospital Mortality

TIMI score was calculated at admission for all patients. Among the non-diabetic patients, in-hospital mortality was 4 (26.67%) in those with TIMI score ≤ 4. In-hospital mortality was 11 (73.33%) with TIMI score > 4. Difference between the two groups was not significant ($p=0.09$). Among the diabetic patients, in-hospital mortality was 2 (20.00%) in those with TIMI score ≤ 4. In-hospital mortality was 8 (80.00%) with TIMI score > 4. Difference between the two groups was not significant ($p=0.24$).

	In-Hospital Mortality Present	In-Hospital Mortality Absent
TIMI score ≤ 4	4	31
TIMI score > 4	11	30

Table 10. TIMI Score and In-Hospital Mortality of Acute MI in Elderly Non-Diabetics

	In-Hospital Mortality Present	In-Hospital Mortality Absent
TIMI score ≤ 4	2	6
TIMI score > 4	8	8

Table 11. TIMI Score and In-Hospital Mortality of Acute MI in Elderly Diabetics

DISCUSSION

We studied the influence of Diabetes on short-term mortality in 100 elderly patients with acute myocardial infarction. The mean age of the study population was 70.26 ± 13.44 years. Of the study population, 24% (n= 24) were diabetic. 30.56% (n=11) females and 20.31% (n= 13) males had diabetes. This is consistent with earlier studies, where incidence of diabetes is more with age and with female gender.⁽⁷⁾

Mean age of patients without diabetes was 70.21 ± 13.44 years. Mean age of the diabetic population was 70.42 ± 13.70 years. Majority of the patients (91%) were between 60 - 80 years of age. 64 patients were males and 36 females.

Acute myocardial infarction in the elderly most commonly involved the inferior and anterior walls in both diabetic and non-diabetic patients. Majority of the patients presented in Killip class 1. This is comparable to the findings of previous studies.

In our study, majority of the patients sought treatment within 4 hours of onset of symptoms. This is in sharp contrast to the findings of CREATE Study.⁽⁴⁾ This can probably be explained by the better access to transportation and healthcare facilities at present in Tamilnadu. Greater awareness of the symptoms of myocardial infarction may also contribute to this observation.

Door to needle time was calculated for the patients who underwent thrombolysis. More than half the patients had a door to needle time > 30 minutes. This was not significantly different for diabetics. One of the probable reasons for this delay would be the unwillingness of the bystanders to consent for thrombolysis once the risks were fully explained.

In-hospital mortality was 25% (n= 25) in the study population, which corresponds to the previous studies. Of the surviving 75 patients, we contacted 38 patients regarding the 30-day mortality. Of those contacted, 2 had expired over the period (day 8 to day 30).⁽⁸⁾

TIMI score was not a significant predictor of in-hospital mortality in elderly diabetics and non-diabetics. The score was calculated at admission. This fails to take into account any worsening that could have occurred during the hospital stay. This may be a probable explanation for the difference from previous studies.⁽⁹⁾ Diabetes mellitus was a significant predictor of in-hospital mortality in the elderly. This corresponds to the findings of previous studies.

Summary

This was an observational cross-sectional study of the short-term mortality of acute myocardial infarction in elderly diabetics and non-diabetics. 100 patients were included in the study. 24 patients were diabetic and 76 non-diabetic. The mean age of diabetics was 70.21 ± 13.44 years and that of non-diabetics was 70.42 ± 13.70 years.

The Salient Findings of the Study were-

- In-hospital mortality of acute myocardial infarction in the elderly was 25%.
- Elderly patients with acute myocardial infarction had a significantly increased chance of in-hospital mortality if they were diabetic.

CONCLUSION

Elderly diabetic patients with acute myocardial infarction had a significantly higher in-hospital mortality as compared to elderly non-diabetics.

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